A SORT THAT WILL DO IT ALL

by Buzz Rudow

After last month's work, and the subsequent MUG newsletter article, Lynn's first question was "Why won't you spend the time to make the sort program work on my 9,200 record file?". There wasn't any acceptable answer except "Yes, Dear", so off I went. The result, edited to be a bit more generic than Lynn's specific need, is shown in the accompanying listing.

The reason for including this program in the newsletter is three-fold. One, many people have asked "What's so great about Basic/z?". This program shows a few of the "great" capabilities. Two, many people have complained about the inability to sort a file which is greater in size than available memory. Now you can. Three, I like to show off, and this is really a pretty neat program.

The concept is pretty straight forward. You sort the file in parts and then merge the intermediate parts back into a whole result. More specifically, the program -

1) Determines the size of the file to be sorted,
2) Determines the amount of memory remaining unused,
3) Divides item 1 by item 2 to determine how many sub-sorts are required,
4) Makes the required number of sub-sorts, saving the results on disk, and,
5) Merges the resultant saved sub-sorts into a master result file.

Does it work? You bet! The program, using a Vector 5005 at 6 Mhz and a 5-Mbyte hard disk, read, sorted, and wrote a resultant pointer file for 9228 records, 1.18 Mbytes of data, in 10 minutes 13 seconds. The input records were 128 bytes wide, the sort field was 14 bytes wide, and the resultant file was 14 bytes wide. Now, that's not too shabby, as any of you who have been sorting will agree. That's a lot of data to be read, sorted and rewritten in 10 minutes.

The program has a maximum capability of 9999 records. This is way more than Lynn has ever been able to sort before. Her response? "Huummm, that's nice. But what are you going to do about this file of 11,500 that I have?" Women! Wives!

Actually, Lynn's request won't be hard to implement. Just change the width to be 37 (sort-width + 5) in line 1090 of the MAIN program, and add another "9" to the FMT statement of line 6480 of the SORT program. The program has the ability to sort any size file using the input parameters you give it. The program isn't dependant on memory size, on file size, or on the width of the sort field. It just makes its calculations and goes about its business. Actually, if you give it parameters that calculate to greater than 19 sub-sorts, Basic/z will abort, as only 20 files can be open at once (the 19 sub-sort files and the 1 result file).

HOW DOES IT WORK

There are two ways to look at this program, logically and specifically. I've tried to separate the two approaches so that those of you who wish to implement the logic in another language don't have to be bothered with the specifics of Basic/z. Of course, I don't know if it can be implemented in another language. Basic/z has some functions, such as SIZE, SPACELEFT, STRING, COMMON, DDIM, ERASE, LASTFILE, END (of file), and SORT that may not be emulatable in other languages. The WHILE and WHENs can be re-coded with IFs and GOTOs, so they shouldn't be a problem. This month we'll look at it logically. Next month I'll explain some of the specifics.

LOOKING AT IT LOGICALLY

The passed variable parameters are set up in a MAIN program. Basic/z allows you to designate data as common to multiple sub-programs. When coding a large program, you break up your application into parts that can be coded into available memory, and then CHAIN back and forth between the sub-programs. The procedure is the same as if you RUN program-y from program-x, but in this case, the common data is already known to program-y, so you don't have to re-prompt for file name, etc. Each sub-program must have an idential COMMON statement as its first variable reference.

DETERMINE THE NUMBER OF SORTS REQUIRED

The problem, of course, is that the size of the file to be sorted, that is, the number of bytes obtained by multiplying the width of a sort field by the number of records to be sorted, is larger than the number of free bytes remaining in memory. If you know the size of free memory and the size of the potential sort array, you can calculate how to break it up. For example, suppose that-

1) The size of the file, in records is 1800
2) The amount of free memory is 28000
3) The sort field width is 38

Then potential sort array = 38 x 1800 = 68,400 bytes. Since you can only sort 28000 bytes at a time, you'll have to make 3 sorts.

potential sort/free memory = 68,400/28000 = 2.44 = 3

Now we can dimension the sort array by dividing the file size by the number of sorts, i.e., 1800/4 = 600.

The code that determines the number of sorts and the sort-array size is located in lines 2000-2090 of the SORT program.

SORT THE PARTS

Sorting the parts isn't too difficult. The code in lines 3000-3100 makes 'n' passes of a single-sort routine. Each pass opens a new intermediate file (3070), reads a block of data the size of your sort array from your input file,

sorts that data, writes the results to the intermediate file, and closes the intermediate file (all in 3080).

MERGE THE PARTS

Now you have 'n' intermediate files sitting out on the disk. The code in lines 4000-4290 creates a merged resultant file. The procedure is to -

1) Open the resultant file (4090).
2) Open all the intermediate files (4110 of loop 4100-4140).
3) Look at the "top" value of each intermediate file (4120 of 4100-4140).
4) Select the "smallest" value (4150-4230).
5) Write it to the resultant file (4240).
6) "POP" the next item in the intermediate file from which the result was extracted, making it be the new "top" value for that file (4240).
7) Repeat steps 3 through 6 until all values of all intermediate files have been accounted for.

```
1000 ! MAIN
1010 !
1020 GOSUB @COMMON
1021 !
1022 !    Determine what you want to do, sort parameters, etc.
1023 !
1030 DRIVE.PROG$="A:"
1040 DRIVE.DATA$="B:"
1050 FILE.NAME$="DATA"
1060 FILE.EXTENTS$=".RDM"
1070 POINT.EXTENT$=".SRT"
1080 REC.SIZE#=32
1090 WIDTH&=36
1100 CHAIN DRIVE.PROG$+"SORT"
1110 !
1120 @COMMON
1130 ! =====
1140 COMMON DATE$(8),DRIVE.PROG$(2),DRIVE.DATA$(2),FILE.NAME$(8),
     FILE.EXTENT$(4),POINT.EXTENT$(4),FLAG&(4),WIDTH&,REC.SIZE#,
     TRANSFER.DATA$(128)
1150 RETURN
```

MAIN Program

```
1000 ! SORT 09/07/85
1010 CLRNONE
1020 GOSUB @COMMON
1030 ARRAY.OUT.SIZE#=39
1040 ARRAYLOC&=0
1050 STRING ""
1060 GOSUB @FILE.SELECT
2000 !
2010 ! ********************************************************************
2020 !
2030 !     Determine the number of parts required
2040 !
2050 NUMBER.OF.SORTS&=INT(SIZE(1)/((SPACELEFT-1000)/(WIDTH&+2)))+1
2060 IF NUMBER.OF.SORTS&=1 THEN NUMBER.OF.SORTS&=2
2070 DDIM FLAGEND&(NUMBER.OF.SORTS&),INDAT$(NUMBER.OF.SORTS&,WIDTH&)
2080 ARRAY.IN.SIZE#=(INT((SIZE(1)+NUMBER.OF.SORTS&-1)/NUMBER.OF.SORTS&))-1
2090 DDIM ARRAY$(ARRAY.IN.SIZE#,WIDTH&)
3000 !
3010 ! ********************************************************************
3020 !
3030 !     Sort the parts
3040 !
3050 FINAL#=0
3060 FOR CURRENT.SORT&=1 TO NUMBER.OF.SORTS&
3070     CREATE 2 DRIVE.PROG$+FILE.NAME$+"."+FMT(CURRENT.SORT&,"999")
3080     GOSUB @SINGLE.SORT
3090     NEXT CURRENT.SORT&
3100 CLOSE 1
4000 !
4010 ! ********************************************************************
4020 !
4030 !     Merge the parts
4040 !
4050 ERASE ARRAY$()
4060 DDIM L$(ARRAY.OUT.SIZE#,WIDTH&)
4070 FORMFEED
4080 PRINT "MERGING INTERMEDIATE FILES - IT TAKES AWHILE"
4090 GOSUB @POINT.SELECT
4100 FOR T&=1 TO NUMBER.OF.SORTS&
4110     OPEN T& DRIVE.PROG$+FILE.NAME$+"."+FMT(T&,"999") END @END.ALL
4120     GOSUB @WRITE.END
4130     IF LEN(INDAT$(T&))=0 AND FLAGEND&(T&)=0 THEN GOTO 4120
4140     NEXT T&
4150 WHILE FLAGSTOP&=0
4160     TEMP$=INDAT$(1)
4170     T&=1
```

```
4180      FOR CURRENT.SORT&=2 TO NUMBER.OF.SORTS&
4190          WHEN INDAT$(CURRENT.SORT&)<TEMP$
4200              TEMP$=INDAT$(CURRENT.SORT&)
4210              T&=CURRENT.SORT&
4220              WHEND
4230          NEXT CURRENT.SORT&
4240      GOSUB @WRITE
4250      FLAGSTOP&=1
4260      FOR CURRENT.SORT&=2 TO NUMBER.OF.SORTS&
4270          IF FLAGEND&(CURRENT.SORT&)=0 THEN FLAGSTOP&=0
4280          NEXT CURRENT.SORT&
4290      WEND
5000 !
5010 ! ************************************************************************
5020 !
5030 !      Clean up at conclusion
5040 !
5050 WHEN ARRAYLOC&>0
5060      FOR LOOP&=ARRAYLOC& TO ARRAY.OUT.SIZE#
5070          L$(LOOP&)=REPEAT$("~",WIDTH&)
5080          NEXT LOOP&
5090      GOSUB @WRITE.TO.DISK
5100      WHEND
5110 FOR CURRENT.SORT&=1 TO NUMBER.OF.SORTS&
5120      CLOSE CURRENT.SORT&
5130      SCRATCH DRIVE.PROG$+"TEMP"+"."+FMT(CURRENT.SORT&,"999")
5140      NEXT CURRENT.SORT&
5150 CLOSE NUMBER.OF.SORTS&+1
5160 CHAIN DRIVE.PROG$+"MAIN"
6000 !
6010 ! ************************************************************************
6020 !
6030 !       Subroutines
6040 !
6050 @SINGLE.SORT
6060 ! ==========
6070 GOSUB @CLEAR.ARRAY
6080 START#=FINAL#+1
6090 FINAL#=ARRAY.IN.SIZE#+START#
6100 GOSUB @SORT.ARRAY
6110 GOSUB @INTERWRITE
6120 RETURN
6130 !
6140 @CLEAR.ARRAY
6150 ! ==========
6160 FOR Q#=0 TO ARRAY.IN.SIZE#
6170      ARRAY$(Q#)=""
6180      NEXT Q#
6190 RETURN
6200 !
```

```
6210 @INTERWRITE
6220 ! =========
6230 PRINT "WRITING INTERMEDIATE"
6240 FOR Q#=0 TO ARRAY.IN.SIZE#
6250     PUTSEQ 2 ARRAY$(Q#)
6260     NEXT Q#
6270 CLOSE 2
6280 RETURN
6290 !
6300 @SORT.ARRAY
6310 ! =========
6320 FORMFEED
6330 PRINT "PASS";CURRENT.SORT&;"OF ";NUMBER.OF.SORTS&
6340 PRINT "READING DATA IN"
6350 FOR LOOP#=START# TO FINAL#
6360     WHEN LOOP# < RECPUT(1)
6370         GET 1 RECORD LOOP# ARRAY$(LOOP#-START#)
6380         GOSUB @FEED.ARRAY
6390         WHEND
6400     NEXT LOOP#
6410 PRINT "SORTING DATA"
6420 SORT ARRAY$(0), ARRAY$(ARRAY.IN.SIZE#), "AL", 250
6430 PRINT "SORT COMPLETE"
6440 RETURN
6450 !
6460 @FEED.ARRAY
6470 ! =========
6480 ARRAY$(LOOP#-START#)=ARRAY$(LOOP#-START#)+FMT(LOOP#,"9999")
6490 RETURN
6500 !
6510 @WRITE.TO.DISK
6520 ! ============
6530 FOR J&=0 TO ARRAY.OUT.SIZE#
6540     PUTSEQ NUMBER.OF.SORTS&+1 L$(J&)
6550     NEXT J&
6560 ARRAYLOC&=0
6570 RETURN
6580 !
6590 @WRITE
6600 ! ====
6610 L$(ARRAYLOC&)=RIGHT$(INDAT$(T&),4)
6620 INCR ARRAYLOC&
6630 IF ARRAYLOC&=40 THEN GOSUB @WRITE.TO.DISK
6640 !
6650 @WRITE.END
6660 ! ========
6670 GETSEQ T& INDAT$(T&)
6680 RETURN
6690 !
```

```
700 @END.ALL
6710 ! ======
6720 INDAT$(LASTFILE)=REPEAT$("~",WIDTH&)
6730 FLAGEND&(LASTFILE)=1
6740 RETURN
6750 !
6760 @FILE.SELECT
6770 ! ==========
6780 OPEN 1 DRIVE.DATA$+FILE.NAME$+FILE.EXTENT$ RECLEN REC.SIZE#
6790 RETURN
6800 !
6810 @POINT.SELECT
6820 ! ===========
6830 OPEN NUMBER.OF.SORTS&+1 DRIVE.DATA$+FILE.NAME$+POINT.EXTENT$ CLEAR
6840 RETURN
6850 !
6860 @COMMON
6870 ! =====
6880 COMMON DATE$(8),DRIVE.PROG$(2),DRIVE.DATA$(2),FILE.NAME$(8),
     FILE.EXTENT$(4),POINT.EXTENT$(4),FLAG&(4),WIDTH&,REC.SIZE#,
     TRANSFER.DATA$(128)
6890 RETURN
```

SORT Program

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THE STATUS OF SYSTEM/Z

by Buzz Rudow

After the article on Bob Zale and System/z in the June newsletter, Bob called me.

He was quite upset with the article's suggestion that he might be developing a version of Basic/z for a specific piece of hardware. Bob stated that he was not doing that, and that he was still working on the generic 16-bit Basic/z. According to Bob, he's had a variety of problems, and has decided to isolate himself from phones and people, so that he can complete the software package.

The conversation started on a somewhat angry tone, as Bob doesn't like the spread of rumors, but it ended friendly enough. Bob and I were to consider a new pricing and marketing program for Basic/z. I was to work out the details of my proposed position, call him back, and negotiate any of his dislikes before implementing the marketing program.

Every time I talk to Bob, his excitment and enthusiasm for the Basic/z product fire me up. Combining that with my own knowledge and great experience with the 8-bit version and, boy, I was ready to go. Everything was great.

About a month passed before I accumulated figures for the advertising expenses. After working up the proposal, I called him. And called him. And called him.

As editor of the MUG, I talk to a lot of people. I hear a lot of new rumors. But I have no idea what's really going on. The Basic/z number is no longer answered by Bob, or Bob's tape recorder, or by Vivian, but by an answering service. They take messages. Little happens. Vivian called back and was told what I wanted to discuss with Bob. I'm still waiting.

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CLASSIFIED

FOR SALE: NEW VG-5 MULTI-USER COMPUTERS

These computers all come with one terminal and 128K RAM, one 630K hard-sectored floppy drive, and one 5, 10, or 32 megabyte Winchester fixed hard drive.

Model 5005E	5 Mb $1,495	Model 5010E	10 Mb $1,995
Model 5032E	32 Mb $2,995	Extra Terminals	$ 495

Prices include a full ninety day warranty.

These are multi-user computers. Up to three stations can be performing different tasks such as word processing or spreadsheet work at the same time.

Each additional terminal includes its own 64K RAM, video boards and 20 foot cable.

Terminals look like Vector 4 computers/stations, have detachable keyboards with function keys, and have a very high resolution green phosphorous screen that is easy on the eyes.

These 5005E, 5010E and 5032E Models came out after the 2600 and 3005 Vector 3's and came after the 5005 5010 and 5032 Vector 5's. They are a later vintage in that they all have 128K, and the latest electronics and video terminals. The "E" in the model number stands for (E)nhanced.

Al Brandli, Al Brandli and Associates, 2176 Pullman St., Suite 103, Costa Mesa CA 92626. Phone (714) 754-6363.

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FOR SALE: See the next two pages for other items available from Al Brandli.

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Al Brandli and Associates (714) 754-6363

INVENTORY CLEARANCE SALE
Good Through December 15, 1985

COMPUTERS

USED Vector 4/20 Computer - 2 630K V3 / MZ compatible hard sector drives, 128K RAM and CP/M-86. MD-DOS optional. Retails for $4,495. **Sale price $1,995.**

USED Vector 4/30 Computer - 1 630K V3 and MZ compatible hard sector drive, 5Mb hard disk, 128K RAM and CP/M-86. Retails for $5,495. **Sale price $2,495.**

USED Vector 4/40 Computer - 1 630K V3 and MZ compatible hard sector drive, 10Mb hard disk, 128K RAM and CP/M-86. Retails for $6,495. **Sale price $2,995.**

USED Vector System B or MZ Computer - with 64K and 300K disk drives. Originally was $6,495. **Sale price $1,195.**

USED Vector 2600 Computer - with 64K and 2 630K hard sector drives. Retail was $3,995. **Sale price $1,995.**

USED Vector 3005 Computer - with 64K, one floppy and a 5 Mb hard disk. Retail was $5,995. **Sale price $2,495.**

USED Vector 3010 Computer - with 64K, one floppy and a 10 Mb hard disk. **Sale price $2,995.**

USED Vector 5005 Computer - with 128K, one floppy and a 5 Mb hard disk. Can accommodate up to four add-on terminals (see below). Retail was $6,250. **Sale price $2,495.**

USED Vector 5010 Computer - with 128K, one floppy and a 10 Mb hard disk. Can accommodate up to four add-on terminals (see below). Retail was $6,750. **Sale price $2,995.**

USED Vector 5005 or 5010 Add-on Terminals - for above two computers. Includes 64K RAM. Retail was $1,685. **Sale price $895.**

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USED Qume Sprint 3 Letter Quality Printer - 40^{+} CPS, interfaces with any Vector Computer. **Sale price $695.**

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NEW Okidata 193S Dot Matrix Printer - 160 CPS draft, 40 CPS correspondence quality, serial interface. Retail was $778. **Sale price $650.**

USED Diablo 1620 Letter Quality Printer with Tractor - 45 CPS, interfaces with any Vector Computer. Did retail for $3,500. **Sale price $995.**

USED Vector M-200 High Speed Dot Matrix Printer - 340 CPS. Very fast (3-4 lines per second). Includes compressed print & cable. Retails for $3,450. **Sale price $1,495.**

MODEMS

NEW Racal Vadic VA212LC 1200/300 Baud Modem - Bell 212A/103 direct connect. Retail was $700. **Sale price $449.**

USED Novation D-CAT Direct Connect Modem - 300 baud & auto answer. Retails for $199. **Sale price $95.**

SOFTWARE

DateMaster - calendaring and appointment software for the Vector 4. Retails for $295. **Sale price $95.**

SOFTWARE (continued)

CP+ Master Programs - a front end for CP/M. Translates CP/M commands into simple English. Excellent for first time user. Retails for $150. ea. **Sale price $25.**

Wordstar, Mailmerge, Spellstar - Retails for $695. **Sale price $199.**

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TIM III - data base management software. Retails for $495. **Sale price $250.**

dBASE II - data base management software. Retails for $495. **Sale price $395.**

Peachtree Order Entry System - for integration of Peachtree Accounts Receivable and Inventory, allows sales order tracking and backorder reporting. Retails for $1,200. **Sale price $400.**

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Memorite III - word processing software. Retails for $450. **Sale price $225.**

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V4 CP/M-86 Programmer's Kit - includes Vector 4 CP/M-86 programming manual and disk. Retails for $150. **Sale price $50.**

BASIC User's Guide - this reference guide is for the BASIC that comes with Memorite III Mail List and most Vector computers. Retails for $60. **Sale price $15.**

C Language Compiler, Lattice 2.12 - with manual. **Sale price $295.**

EXPANSION HARDWARE

Hard Disk Upgrades - add a 5, 10 or 32 megabyte hard drive to your dual floppy computer (2600, 4/20, etc.). Replace the drive in your 5 megabyte computer (3005, 5005, 4/30, etc.) with a 10 megabyte drive or call for a price quote.

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Wyse 75 CRT - for VMX multi-user and most non-Vector computer systems. Includes cable. Retails for $845. **Sale price $595.**

Vector 3 Extended CP/M Upgrade - convert your Vector 3 to a 128K system. Retails for $650. **Sale price $300.**

USED Hard Sector Floppy Drive - upgrade your single floppy Vector 3 (VIP or 1600) to a dual drive 2600. Reduces floppy backup hassle and adds utility and capacity to, e.g., Memorite III. Retails for $1,200. **Sale price $495.**

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Double-sided Vector Diskettes - $10 off our already low price of $60./box of 10 when you buy two boxes or more. These diskettes come with plastic library case.

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Continuous Form Feed Paper - 8 1/2" x 11". 15# or 18#. $10 off our regular price of $40. **Sale price $30.**

Continuous Tractor Feed Paper - 12" x 8 1/2" tears down to 8 1/2" x 11", fits in your printer as 11" wide and 8 1/2" length instead of the 8 1/2" wide and 11" length. **NCR (carbonless) 3-part $40./box. Plain (normal) 1-part $20./box.**

QUANTITIES ARE LIMITED SO INQUIRE NOW BY CALLING (714) 754-6363.

CLASSIFIED (cont.)

FOR SALE: SECOM is discontinuing its Vector Graphic dealership and has two demonstration machines for sale.

System 1 is a VSX machine with a 10MB hard disk, 128K and a soft-sectored 720K floppy drive. It has both CPM/86 (includes RUN-80 for 8-bit programs) and MS-DOS operating systems and MEMORITE III, CONECT, DataMgr and Exec-u-Plan application software. It also has a NEC 7700 printer (letter quality, 55 cps). $4,500.

System 2 is also a VSX machine with a 10MB hard disk, 128K and a 720K floppy drive. It also has CPM/86 and MS-DOS operating systems and MEMORITE III. $3,350.

We also have a small store of Vector 4 parts, including a full parts kit, two motherboards, two HD/SD Controller cards, 2 9A power supplies and 2 Hard Sector floppy drives. We will consider any reasonable offer for the parts.

W. Thomas Hansen, Systems Engineering Company of Maine, P.O. Box 276, Sangerville Maine 04479. Phone (207) 876-3349.

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FOR SALE: Four Hundred used 8", DS DD Scotch 743-0 soft sector disks. Make offer.

Don Warner, (816) 358-1004. Early morning, central time.

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FOR SALE: Vector Graphic with Memorite 3, CP/M, MDOS, Basic/z, Data Smith Bookkeeping, a custom database program, all manuals, a DEC LA-50 printer, and 44 MUG newsletters. $850. Matt Bufam (608) 362-1340.

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FOR SALE: Vector Graphic 2600 with 2 tandon 630K drives. System has less than 100 hours of actual use. Shipping included. $1550. Donald B. Hein, (612) 451-6600 before 10 PM.

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FOR SALE: Vector Graphic 48K dynamic memory and 8K static memory. Working when removed from my MZ. $50.00 each.

Gary A. Van Cott, P.O. Box 1879, Grafton VA 23692. (804) 898-3680 (evenings or weekends).

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CLASSIFIED (cont.)

WANTED: Two Vector Graphic 8K static ram memory boards. (Do not want 1 16K; but rather need individual 8K boards). Also want 1 Bit Streamer I/O board. Mark Levy, (602) 992-8199 (mornings) or (602) 483-0949 (evenings).

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FOR SALE: Two Micropolis bare (no power supply or enclosure) single-sided drives (model 1053; MOD IIs. $135 each. Mark Levy, (602) 992-8199 (mornings) or (602) 483-0949 (evenings).

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* MICROPOLIS/VECTOR GRAPHIC USERS GROUP NEWSLETTER *
* Published Monthly by DAMAN, 604 Springwood Circle, Huntsville AL 35803-1740 *
* Subscription rates: North America; $18/year Elsewhere; $25/year, Airmailed *
*
* For Assistance with general information, MUG/Vector Graphic, DAMAN hardware *
* & software, Micropolis Basic, Basic/z, Micropolis drives & Micropolis parts-*
*
* Call Lynn at (205)881-1697 during the Central Times of 9 AM to 5 PM. Buzz *
* is sometimes around in the evening (Lynn will know) and from 9 - 12 on Sat. *
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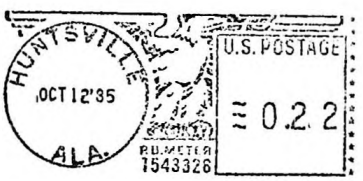

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